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ABSTRACTS
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Studies on the Chemical Constituents of Tobacco. IV.—On the Enzymes in the Yellow Tobacco (II). (pp. 105~113): By Takeo NITO and Eiju KITAMURA. (Mito Experiment Station, Government Monopoly Bureau, Japan.)

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Ueber die Amyloverfahren (III). (pp. 129~138): Von H. MUTA und K. TANAKA. (Government Research Institute, Formosa Japan.)

Studies on the Amylase of Yeast. V.—On the Enzym-chemical Properties (2). The Change of Starch Saccharifying Action of Yeast Amylase with the Lapse of Time and Correlation between the Amount of Enzyme and Starch used and that of Starch Saccharified. (pp. 139~144): By Kazuki ONO. (Biochemical Laboratory of Taihoku Imperial University, Japan.)

On the Process of Soil Formation in Kyushu. (pp. 145～150):

By R. KAWASHIMA. (Agricultural Chemical Laboratory, Kyushu Imperial University.)

From this and previously reported results the author could bring in a good example on the principle of soil formation process, namely;

(1) The higher the mean annual temperature and humidity, the more silicic acid than sesquioxide is washed away.

(2) In the districts in which the climatic conditions are approximately equal, soils of nearly equal chemical nature are formed.

The climatic conditions of related districts and the chemical characteristics of soils are briefly summarized as in the following tables.

1. The climatic conditions of related destricts.

Loculity	years observed	Mean annual temperature (°C)	Mean annual precipitation (mm)	Mean annual humidity	Meyer's NS quotient
Miyazaki	46	16.6	2569.0	78.7	859
Kumamoto	41	15.5	1789.2	78.1	625
Fukuoka	42	14.9	1586.7	77.9	571
Simonoseki	46	15.2	1638.5	75.3	517

2. Reaction, exchangeable lime, loss on ignition of fine soil below 2 mm in diameter (the latter two are on dry basis).

Soils from	Mother rock	pH		Exchange acidity	Exchange-abl CaO	Loss on ignition
		H_2O	KCl	($y_1 \times 3$)	(%)	(%)
Miyazaki	Volcanic rock	5.61	5.09	0.2	0.018	11.36
Kumamoto	Andesite	4.41	3.75	18.9	0.055	12.84
Fukuoka	〃	3.65	3.24	71.7	0.003	8.72
〃	Porphyrite	5.22	4.01	56.6	0.023	7.09
〃	Basalt	3.44	3.04	55.6	0.006	9.81
〃	Granite	3.39	3.15	115.1	0.006	10.56
〃	Tertiary	4.29	3.80	182.4	——	10.47
Simonoseki	Cretaceous	4.62	3.94	58.0	0.068	11.38
Fukuoka	Paleozoic, slate	3.77	3.54	73.8	0.014	11.34
〃	{Paleozoic, limestone	3.64	3.39	187.2	0.004	10.30
〃	Schistose rock	4.40	3.44	119.8	0.006	9.12

The low acidity of Miyazaki soil is due to narrower silica-sesquioxide ratio in colloidal clay as is seen in next table. The other soils are highly acidic. The all soils are extremely defiicient in exchangeable lime.

3. The colloidal clay below 0.001 mm in diameter is separated by settling method and analysed by using both Hardy's Tri-acids mixture and HCl.

From the analytical results SiO_2/Al_2O_3 and SiO_2/R_2O_3 are given ;

Soils from	Mother rocks	by Tri-acid		by HCl	
		$\frac{SiO_2}{Al_2O_3}$	$\frac{SiO_2}{R_2O_3}$	$\frac{SiO_2}{Al_2O_3}$	$\frac{SiO_2}{R_2O_3}$
Miyazaki	Volcanic ash	1.03	0.91	0.99	0.88
Kumamoto	Andesite	1.25	1.10	1.31	1.15
Fukuoka	〃	1.86	1.53	1.62	1.32
〃	Prophyrite	1.92	1.49	1.85	1.47
〃	Basalt	1.71	1.30	1.65	1.20
〃	Granite	1.78	1.49	1.96	1.53
〃	Tertiary	1.99	1.64	2.24	1.66
Simonoseki	Cretaceous	2.27	1.61	3.25	1.75
Fukuoka	Paleozoic, slate	1.94	1.31	2.20	1.27
〃	Paleozoic, limestone	1.89	1.25	1.84	1.04
〃	Schistose rock	1.93	1.35	1.46	0.95

As in the above table the silica-sesquioxide ratio of colloidal clay in soil from the warmer and more humid Miyazaki is the narrowest. That of Kumamoto soil comes next. In Fukuoka and Simonoseki districts where the climatic conditions are alike, soils of nearly equal chemical nature are formed from quite different mother rocks.

The Influence Monochromatic Lights on the Action of Proteolytic enzymes in the Yeasts. (pp. 151∼171) : By Reitaro MURAKAMI.

(Agricultural College, Utsunomiya.)

In order to investigate the influence of spectral monochromatic lights on the action of the proteolytic enzymes in the yeasts, the author has added 0.005 or 0.01 g of zymin of Saccharomyces cerevisiae and S. ellipsoideus into the test tubes containg the substrates, which were prepared as follows :- (a) 0.1 g of fibrin coloured by carmine and 5 cc of 0.1% gelatine solution and 0.35 cc of citrate buffer solution, (c) 5 cc of 5% gelatine solution and 1.255 cc of phosphate buffer solution, (d) 5 cc of gelatine solution and 1 cc of 0.2 % NaOH solution, (e) 5 cc of 0.4% Na_2CO_3 solution in which 0.2 g of casein are dissolved and (f) 5 cc of 0.4% Na_2CO_3 solution in which 0.2 g of casein are dissolved and 0.5 cc of 0.2% NaOH solution. Gelatine and casein solutions were previously sterilized by the ordinary method.

The tubes were placed within the tinned boxes, at the front windows of which the monochromatic filters of red, yellow, green I, green II, blue I, blue II, violet I and violet II were placed. The filters of white and black passing respectively all and no visible light were also applied as the controls. The boxes containing the test tubes were incubated at 36∼37°C and lighted by an electric lamp through the filters.

The tubes were taken out from each box at the intervals of 12, 24, 36, 48, 72 and 96 hours after the incubation, and then the end products of the hydrolysis were determined by the following methods :– in (a) by colorimetry, in (b) (c) (d) and (f) by Sörensen's formol method and in (e) by Willstätter's alcoholic method.

In this experiment the apparent action on the proteolytic enzymes in the yeasts was found to be stronger under the rays of longer wave length, i. e. the red region and it was gradually weaker under the rays of shorter wave length, i. e. green∼violet in most cases. Generally, the action was most inferior in the dark.

But, the proportions of the action of proteolytic enzyme in the yeasts for an unit intensity of the rays was greatest in the dark and had been declind to the marked degrees under the monochromatic and white lights, besides, the proteolytic enzymes was found to be in inverse effect in comparison with the intensities of the rays.

Hence, the rays present the positive stimulant action for the proteolytic enzyms in the yeasts, but the effect has been decreased successively with their intensities.

The Influence of Monochromatic Lights on the Oxidation and Reduction of Yeasts. (pp. 172∼174): By Reitaro MURAKAMI.

(Agricultural College, Utsunomiya.)

In order to investigate the influence of spectral monochromatic lights on the oxidation and reduction of yeast, the author has applied *p*-phenylenediamine and methylene blue reactions to saccharomyces cerevisiae and S. ellipsoideus. As to the filters used this experiment see the table in author's previous paper ("The Influence of Monochromatic Lights on the Action of Preteolytic enzymes in the Yeasts"). The time which changed the colour of *p*-phenylenediamine to deep purple and disappeared the colour of methylene blue were estimated.

In this experiment the oxidation of the yeast was not great difference, but was found to be sooner under the rays of red and green regions. The reduction of the yeasts was found to be sooner under the rays of longer wave length, i. e. of the red-yellow regions and it was gradually later under the rays of shorter wave length, i. e. of green∼violet.

The Influence of Monochromatic Lights on the Action the of the Amylase in the Yeasts. (Part I.) (pp. 175~179): By Reitaro MURAKAMI. (Agricultural College, Utsunomiya.)

In order to investigate the influence of spectral monochromatic lights on the action of the amylase in the yeasts, the author has added 10 cc of the enzyme solution and 10 cc of phosphate buffer solution into the test tubes containing 10 cc of 1% soluble starch solution. Enzyme solution was prepared by the autolysis of 2.5 days after 500 cc of water added into 200 g of oriental pressed yeast.

The tubes were placed within the tinned boxes, at the front windows of which the monochromatic filters of red, yellow, green, blue violet and ultra vit glass were placed. The filters of white and black passing respectively all and no visible rays were also applied as the controls. The boxes containing the test tubes were incubated at 30°C and lighted by an electric lamp through the layer of cupper salt solution absorb infra red rays and the filters.

The tubes were taken out from each boxes at the intervals of 6 and 12 hours after the incubation and then the end products of the hydrolysis were determined by Bertrand's method.

In this experiment the apparent effect on the amylase in the yeasts was found to be stronger under the rays of longer wave length, i. e. the red region and it was gradually weaker under the rays of shorter wave length, i. e. green~violet. The action was most inferior in the dark.

But the proportions of the end product by the amylase for an unit intensity of the rays was found to be in inverse effect in comparison with their intensities.

Hence, the rays present the positive stimulant action for the amylase in the yeast, but the effect has been decreased successively with their intensities.

The Influence of Monochromatic Lights on the Action of the Amylase in the Yeasts. (Part II.) (pp. 180~183): By Reitaro MURAKAMI. (Agricultural College, Utsunomiya.)

In order to further investigate the influence of the intensities of spectral monochromatic lights on the action of the amylase in the yeasts, the authors has continued the researches as the previous paper using the monochromatic filters of red, green, blue and violet which respectively possessed of 4 different intensities.

In this experiment the proportions of the end products by the amylase in the yeasts was found to be increased with the intensities in the same monochromatic light, but to be in inverse effect in comparison with an unit intensity of all monochromatic lights.

Hence, it was confirmed that the rays present the positive stimulant action for the amylase in the yeast, but the effect has been decreased successively with their intensities.

Sterilising Action of Acids. (6) Report.—Sterilizing Action of Halogenated Fatty Acids on Putrifactive bacteria, Bac. typhosus and Vib. cholerae. (pp. 184∼190): By Sogo TETSUMOTO.

On the sterilizing action and poisoning power of halogenated phenols, many studies were reported, but on the sterilizing action of halogenated fatty acids we know few study. I studied the sterilizing action of halogenated fatty acids to know results of sterilization at the same molecular concentration and also the special character comparing other fatty acids having the same C atom.

Microorganisms, experimental methods and temperature during experiment, are the same as I reported previously.(1)

1. *Reagents,*

The name of reagents and pH of *N*/100, and *N*/1000 of each acid are as shown in the following table.

TABLE I.

Acid	Rational formulae	M. W.	M. P.	B. P.
Mono-Cl-acetic	CH_2CHCO_2H	94.494		186°C
Di- 〃 〃	$CH\cdot Cl_2\cdot CO_2H$	128.936		191〃
Tri- 〃 〃	$C\cdot Cl_3\cdot CO_2H$	163.398		195〃
α-Cl-propionic	$CH_3\cdot CH\cdot Cl\cdot CO_2H$	108.50		186〃
β-I-propionic	$CH_2\cdot I\cdot CH_2\cdot CO_2H$	199.975	28°C	
α-Br-isovaleric	$\begin{matrix}CH_3\\CH_3\end{matrix}\!>CH\cdot CH\cdot Br\cdot CO_2H$	181.017	44〃	

M. W.……Molecular weight M. P.……Melting point B. P.……Boiling point

2. *Sterilizing action of halogenated fatty acids at the same molecular concentration.*

I studied the sterilizing action of halogenated fatty acids of the same concentration at 20°C and the results obtained are as shown in following table II (1 and 2).

TABLE II. *Sterilizing action at the same concentration of halogenated fatty acids at 20°C.*

1. At $N/100$

Acid	pH	Surviving period			
		Staph. c. pyog.	Prot. vular.	Bac. typhosus.	Vib. choler.
Mono-Cl-acetic	2.68	45m + 60m −	15m + 20m −	30m ± 45m −	1m ± 2.5m −
Di-Cl- 〃	2.54	20 + 30 −	10 + 15 −	15 ± 20 −	1 −
Tri-Cl- 〃	2.33	10 ± 15 −	2.5 + 5 −	5 + 10 −	1 −
α-Cl-propion.	2.43	30 + 45 −	15 ± 20 −	20 + 30 −	1 ± 2.5 −
β-I-propion.	2.47	20 ± 30 −	10 + 15 −	15 ± 20 −	1 ± 2.5 −
α-Br-isovaler.	2.43	15 ± 20 −	5 ± 10 −	10 ± 15 −	1 −
Control	6.80	8d+	5d+	6d±	12h+

Note: +…………Microorganism alive.
−…………Microorganism dead.
±…………Sometimes alive and sometimes dead.
m……minute. h……hour. d……day.

2. At $N/1000$.

Acid	pH	Surviving period			
		Staph. c. pyog.	Prot. vulgar.	Bac. typhos.	Vib. choler.
Mono-Cl-acetic	3.25	6 h + 9 h −	60m + 90 m −	3 h + 6 h −	5m + 10m −
Di-Cl- 〃	3.16	3 + 6 −	60 ± 90 −	2 + 3 −	5 ± 10 −
Tri- 〃 〃	3.09	90m + 2 h −	30 ± 45 −	60m + 90m −	2.5 ± 5 −
α-Cl-propion.	3.16	6 h ± 9 h −	45 + 60 −	2 h + 3 h −	5 ± 10 −
β-I- 〃	〃	3 + 6 −	〃 〃	2 ± 3 −	2.5 + 5 −
α-Br-isovaler.	3.09	2 ± 3 −	30 + 45 −	90m + 2 h −	2.5 ± 5 −
Control	6.80	8d+	5d±	6d±	12h+

From the results noted in the table II, 1 and 2, we know next facts.

Tri-Cl-acetic acid > α-Br-isovaleric acid > Di-Cl-acetic acid > Mono-Cl-acetic acid.
〃 > 〃 > α-Cl-propionic acid > 〃
〃 > 〃 > β-I propionic acid > 〃

Di-Cl-acetic acid, α-Cl-propionic acid, and β-I-propionic acid have nearly the same sterilizing power. Accordingly we know that the sterilizing action of halogenated fatty acids grows strong proportionally to the increasing number of halogen atom which substituted for H atom combined at alkyl group. Besides chlorinated fatty acids brominated and iodined fatty acids have also strong sterilizing action respectively.

3. *Sterilizing action of anions of halogenated fatty acids.*

To know the sterilizing action of anions of halogenated fatty acids I made $N/100$ aqueous solution of neutral salt of Na, Ca and NH_4 having the same anions of halogenated fatty acids. Results are as shown in tabe III (1, 2, 3 and 4).

TABLE III. *Sterilizing action of anions of halogenated fatty acids.*

1. Sterilizing action on Staph. coc. pyogenes aureus.

Reagent	Surviving period at $N/100$		
	Na-salt	Ca-salt	NH_4-salt
Mono-Cl-acetate	2d + 3d –	36h + 2d –	3d ± 4d –
Di- 〃 〃	36h + 2d –	24h + 36h –	2 + 3 –
Tri- 〃 〃	12h + 24h –	12 + 24 –	24h + 36h –
α-Cl-propionate	36 + 2d –	36h + 2d –	2d + 3d –
β-I- 〃	〃 〃	〃 〃	〃 〃
α-Br-isovalerianate	24h + 36h –	24h + 36h –	36h + 2d –
Control	8d+	8d+	8d+

2. Sterilizing action on Proteus vulgaris, Hauser.

Reagent	Surviving period at $N/100$		
	Na-salt	Ca-salt	NH_4-salt
Mono-Cl-acetate	24h + 36h –	12h + 24h –	36h + 2d –
Di- 〃 〃	12 + 24 –	9 + 12 –	24 + 36h –
Tri- 〃 〃	9 + 12 –	6 + 9 –	12 ± 24 –
α-Cl-propionate	24 + 36 –	12 + 24 –	24 + 36 –
β-I- 〃	〃 〃	12 ± 24 –	〃 〃
α-Br-isovaleriante	9 + 12 –	9 + 12 –	12 + 24 –
Control	5d±	5d±	5d±

3. Sterilizing action on Bac. typhosus.

Reagent	Surviving period at $N/100$		
	Na-salt	Ca-salt	NH_4-salt
Mono-Cl-acetate	36h + 2d –	36h ± 48h –	2d + 3d –
Di- 〃 〃	24 + 36 –	24 + 36 –	36h + 2d –
Tri- 〃 〃	12 + 24 –	12 + 24 –	24 + 36 –
α-Cl-propionate	36 + 2d –	24 + 36 –	36 + 2d –
β-I- 〃	36 ± 2d –	〃 〃	〃 〃
α-Br-isovalerianate	24 + 36h –	12 + 24 –	36 ± 2d –
Control	6d±	6d±	6d±

4. Sterilizing action on Vib. cholerae.

Reagent	Surviving period at $N/100$		
	Na-salt	Ca-salt	NH_4-salt
Mono-Cl-acetate	45m + 60m −	30m + 45m −	60m + 90m −
Di- 〃 〃	30 + 45 −	30 ± 45 −	45 + 60 −
Tri- 〃 〃	20 + 30 −	20 + 30 −	30 + 45 −
α-Cl-propionate	45 + 60 −	30 + 45 −	60 + 90 −
β-I- 〃	30 + 45 −	〃 〃	〃 〃
α-Br-isovalerianate	30 ± 40 −	20 + 30 −	30 + 45 −
Control	12h+	12h+	12h+

From results noted on above table III (1, 2, 3 and 4), we know these facts: Neutral salts of halogenated fatty acids have the relatively strong sterilizing action on microorganisms. At Cl substitution products, the sterilizing action increases proportionally to the number of Cl atom. Accordingly we know that anions of fatty acids have relatively strong sterilizing action respectively and their sterilizing action increase proportionally to the number of halogen atom which substituted for H atom combined at alkyl group.

4. *Comparison of sterilizing action between halogenated fatty acids and monobasic fatty acids.*

I compared the sterilizing power between halogenated fatty acids and saturated and unsaturated monobasic fatty acids having the same number of C atom, at the same molecular concentration and at the same aq. solution of pH. The results are as follows. At the same molecular concentration and also at the same pH solution, the sterilizing action of each acids is stronger than that of saturated or unsaturated monobasic fatty acids of the same number of C atom. And then anions of each acid of halogenated fatty acids have stronger sterilizing action than that of monobasic fatty acids respectively.

SUMMARY

I studied the sterilizing action of halogenated fatty aids on putrifactive bacteria, Bac. typhosus and Vib. cholerae by the same method as I reported previously. By this study we know next facts.

(1) At the same concentration, the strength of the sterilizing action is as follows: Tri-Cl-acetic acid>α-Br-isovaleric acid>Di-Cl-acetic acid>Mono-Cl-acetic acid. β-I-propionic acid, α-Cl-propionic acid and Di-Cl-acetic acid have nearly the same sterilizing power.

(2) At the same molecular concentration and pH solution, the sterilizing action of each of halogenated fatty acids is stronger than that of saturat-

ed or unsaturated monobasic fatty acids of the same numder of C atom.

(3) Salt of each halogenated fatty acids has the strong sterilizing action respectively. Among salts, Ca salts have the relatively strong sterilizing action and NH_4- salts have relatively weak sterilizing action.

(4) Anion of each halogenated fatty acids has the relatively strong sterilizing action.

(5) The strong sterilizing action of halogenated fatty acids is due to the low value of pH of each acids, and then the increase of the toxic power by combination of halogen atom in alkyl group for H atom.

(6) Sterilizing action of Cl-acetic acids increases its power proportionally to the increasing number of Cl atom combined in alkyl group.

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